

Lecture Module - Sensors

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

Topic 1 - Introduction and Overview

Topic 1 - Introduction and Overview

- Classification of Sensors
- Analog and Digital Sensors
- Example 1: Distance or Range
- Example 2: Rotation

Classification of Sensors

a **sensor**, a physical element that employs some natural phenomenon...
...to sense the variable being measured

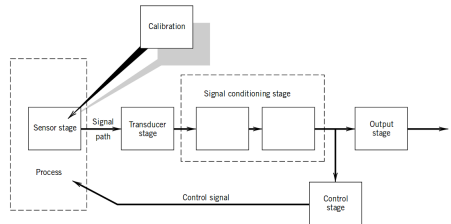
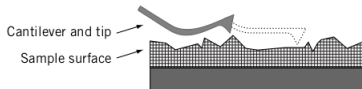


Figure 1.5 Components of a general measurement system.

Classification of Sensors

Generate ideas as a group.

Classification of Sensors

(space for more ideas)

Classification of Sensors
Analog and Digital Sensors
Example 1: Distance or Range
Example 2: Rotation
Example 3: Orientation

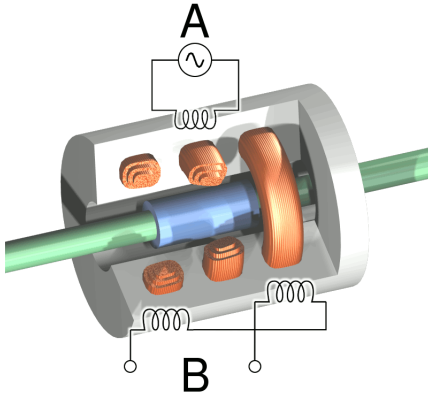
Analog and Digital Sensors

Analog	Digital	Both?
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Example 1: Distance or Range

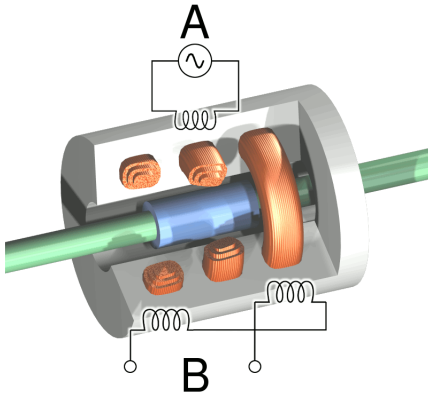
Thought Exercise: How do we measure distance (aka range)?

Example 1: Distance or Range



LVDTs with NI
LVDT Animation

Example 1: Distance or Range



Example 2: Rotation

Thought Exercise: How do we measure **rotation**?

- What variable or quantity is used to describe **rotation**?
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 -
 -
- What type of sensor is used to measure this?
 -
 -
 -

Example 2: Rotation

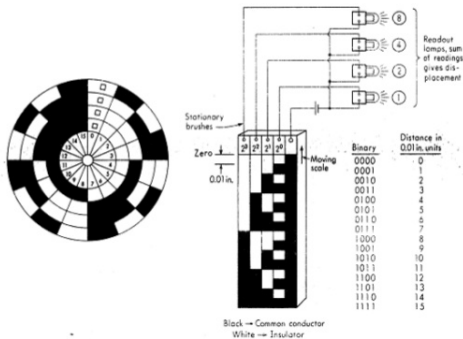
Rotational Potentiometer



Example 2: Rotation

Absolute Encoder

4-Bit Binary Optical Absolute Encoder Disk

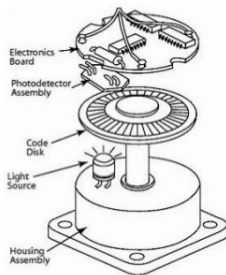


Example 2: Rotation

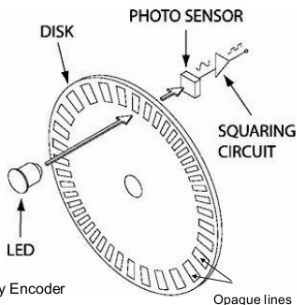
Incremental Encoder

2. Types of Rotary Encoder - Incremental

Construction of Incremental Rotary Encoder



Components inside Incremental Rotary Encoder



Example 2: Rotation

- What applications require this type of sensor?



Example 2: Rotation

- How does this type of sensor work?



Example 3: Orientation

Thought Exercise: How do we measure **orientation**?

- What variable or quantity is used to describe **orientation**?
 -
 -
 -
- What type of sensor is used to measure this?
 -
 -
 -

Example 3: Orientation

- What applications require this type of sensor?



Example 3: Orientation

- How does this type of sensor work?

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